



Nacelle actuation capabilities

Collins Aerospace offers:

- Hydraulic and electric thrust reverser actuation systems (TRAS), with a portfolio of certified products that range from 3,000 to 5,000 psi hydraulic systems to 230 VAC variable frequency electric TRAS
- Powered and unpowered door opening systems – hydraulic and electric

HYDRAULIC TRAS

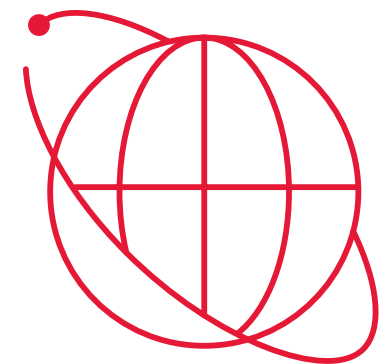
- Used to position a nacelle translating sleeve to provide reverse thrust to the aircraft
- Pressurized and deployed only during reverse thrust; at all other times, the system is exposed to return pressure and stowed and locked
- Requires minimal maintenance and is highly reliable
- Significant in-service experience with over 600 million flight hours

ELECTRIC TRAS

- Used to position a nacelle translating sleeve to provide reverse thrust to the aircraft
- Deployed and stowed using an electric motor commanded by an electronic control box communicating with aircraft computers
- 15-20% aircraft weight reduction by removing fluid and pipework, compared with hydraulic TRAS
- Reduces need for engine hydraulics
- Integrates prognostic health monitoring for advanced system fault detection

BESPOKE ACTUATION FOR AIRCRAFT

- Airbus A320, A320neo and A350
- Boeing 787
- Bombardier CRJ
- Embraer E2
- Mitsubishi Regional Jet



Globally located to serve

LOCATION	COUNTRY	CAPABILITIES
Wolverhampton	UK	Engineering, machining, assembly, repair and overhaul
Bangalore	India	Engineering and assembly
Bandung	Indonesia	Machining, assembly and special processing
Wroclaw	Poland	Engineering and machining

To learn more, go

collinsaerospace.com/actuation

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TAILOR-MADE FOR HIGH PERFORMANCE – ANY COMPLEXITY

Global capabilities in design, development, manufacturing and integration

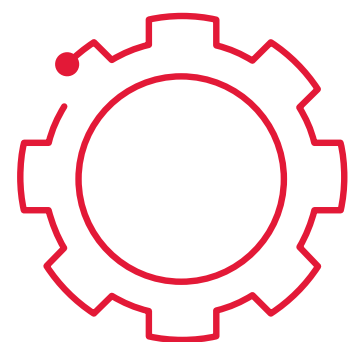


YOUR SATISFACTION BACKED BY 600 MILLION FLIGHT HOURS

No matter how complex your nacelle actuation needs – or where they are around the globe – Collins Aerospace has the experience, technological capability and driven customer focus to meet them.

Over the last 35 years, we've equipped a wide variety of customer aircraft with tailor-made, seamlessly integrated nacelle actuation, delivering efficiencies in weight, maintenance, manufacturing cost and a reduced environmental impact.

Our highly reliable nacelle actuation systems collectively have logged more than 600 million flight hours. They keep going strong and so do we. Collins Aerospace continues to innovate nacelle actuation with hydraulic and electric solutions that feature advanced materials. We're always looking for innovative ways that benefit you, your customers and the planet.



Aircraft-on-ground support anytime, anywhere

Access to the right components, where and when you need them, means you can get back to the business of flying without unnecessary delays. Our dedicated aircraft-on-ground (AOG) service offers you:

- Competitive and guaranteed turnaround times
- 24/7/365 support
- Ready to dispatch component availability within 48 hours
- Globally located stock of components and repair centers
- OEM airworthiness certification
- Extended warranties and reliability guarantees

• Electric TRAS, A350



• DOS C-Duct Actuator, A320neo



• A350 TRAS product family



• Locking Feedback Actuator

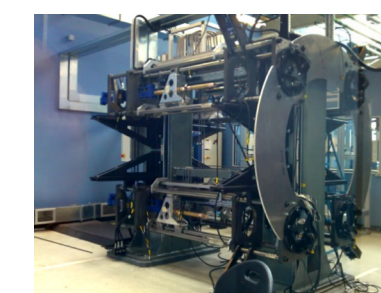
TEST CAPABILITIES

Collins Aerospace offers both system-level and individual qualification testing. We will continue to create modular, adaptable test-rig capabilities that can easily accommodate larger or smaller nacelle thrust reverser actuation systems (TRAS) configurations.

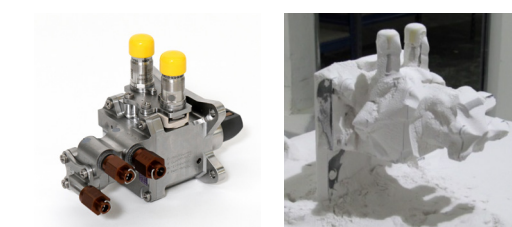
- Aircraft endurance and fatigue cycles
- Mechanical strength
- Hydraulic performance
- Environmental



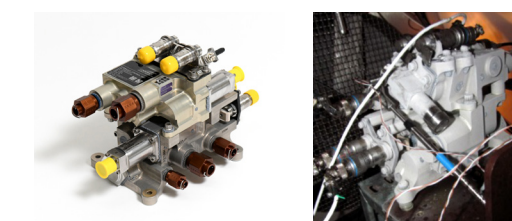
Aircraft endurance and fatigue cycles electric thrust reverser system rig



Aircraft endurance and fatigue cycles hydraulic thrust reverser system rig



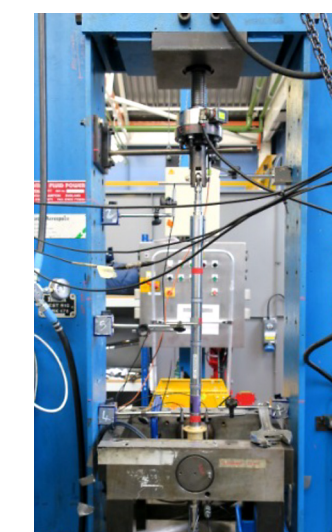
24-hour sand and dust blast exposure



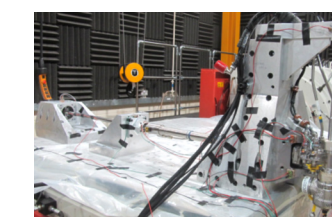
-20° C, 50,000-foot environmental cycling



Five-minute 1,093° C fire exposure



Seven-ton mechanical strength



Twelve-hour, 20g vibration exposure